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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

Subject code: CS8691	**Branch/Year/Sem: CSE/III/VI**
Subject Name: ARTIFICIAL INTELLIGENCE	**Batch:2017-2021**
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	UNIT I INTRODUCTION
S.NO	**PART-A**
1	What is AI? Artificial Intelligence is the branch of computer science concerned with making computers behave like humans. "the study and design of intelligent agents," where an intelligent agent is a system that perceives its environment and takes actions which maximize its chances of success.
2	List out the applications of AI. Autonomous planning, Control and scheduling. Game Playing and Robotics.
3	Define an agent. An agent is anything that can be viewed as perceiving its environment through sensors and SENSOR acting upon that environment through actuators.
4	List the various type of agent program. Simple reflex agent program. Agent that keep track of the world. Goal based agent program. Utility based agent program.
5	Define Agent function Mathematically speaking, we say that an agent's behavior is described by the agent function that maps any given percept sequence to an action. $f : \mathcal{P}^* \rightarrow \mathcal{A}$
6	What is rational agent? A rational agent is one that does the right thing-conceptually speaking; every entry in the table for the agent function is filled out correctly. Obviously, doing the right thing is better than doing the wrong thing. The right action is the one that will cause the agent to be most successful.
7	List out the properties of task environments.

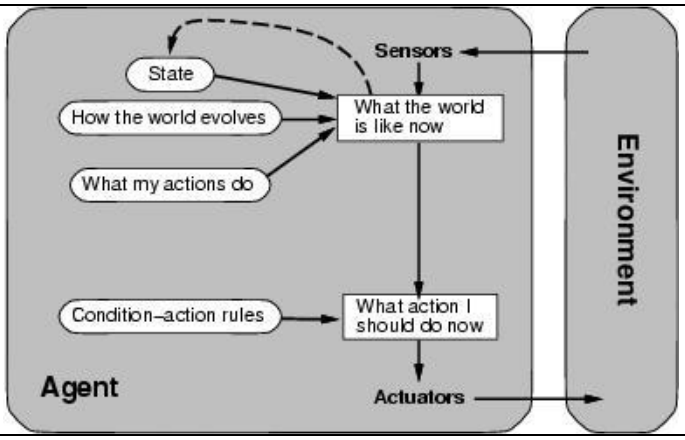
<table>
<tr><td></td><td>

Fully observable vs. partially observable
Deterministic vs. stochastic
Episodic vs. sequential
Static vs. dynamic
Discrete vs. continuous
Single agent vs. multiagent

</td></tr>
<tr><td>8</td><td>Compare single agent Vs multi agent
Single agent vs. multiagent.

An agent solving a crossword puzzle by itself is clearly in a single-agent environment,
Where as an agent playing chess is in a two-agent environment.
Multiagent is further classified in to two ways
Competitive multiagent environment
Cooperative multiagent environment

</td></tr>
<tr><td>9</td><td>Define Simple reflex agents
Simple reflex agents are based on condition-action rules, implemented with an appropriate production system. They are stateless devices which do not have memory of past world states.</td></tr>
<tr><td>10</td><td>Compare mapping actions to agents.
An agent program maps from percept to action and updates internal state.
- Reflex agents respond immediately to percepts.
• simple reflex agents
• model-based reflex agents
- Goal-based agents act in order to achieve their goal(s).
- Utility-based agents maximize their own utility function</td></tr>
<tr><td>11</td><td>Define Omniscience agent.
An omniscient agent knows the actual outcome of its actions and can act accordingly; but omniscience is impossible in reality. Doing actions in order to modify future percepts-sometimes called information gathering-is an important part of rationality.</td></tr>
<tr><td>12</td><td>Give an example for Performance measures in agents
<table>
<tr><td>Agent Type</td><td>Performance Measure</td><td>Environments</td><td>Actuators</td><td>Sensors</td></tr>
<tr><td>Taxi driver</td><td>Safe: fast, legal, comfortable trip, maximize profits</td><td>Roads,other traffic,pedestrians, customers</td><td>Steering,accelerator, brake, Signal,horn,display</td><td>Cameras,sonar, Speedometer,GPS, Odometer,engine sensors,keyboards, accelerator.</td></tr>
</table>
</td></tr>
<tr><td>13</td><td>Compare Deterministic vs. stochastic.
Deterministic vs. stochastic.
 If the next state of the environment is completely determined by the current state and the action executed by the agent, then we say the environment is deterministic;
 Otherwise, it is stochastic.</td></tr>
<tr><td>14</td><td>How to represent model reflex agent.</td></tr>
</table>

	
15	Classify the components used in learning elements. A learning agent can be divided into four conceptual components, as, • Learning element • Performance element • Critic • Problem generator
	PART-B
1	Explain properties of environments.
2	Explain in detail the structure of different intelligent agents.
3	Define agents. Specify the PEAS measures with an example.
4	Explain the components of problem definition with an example.

	UNIT II PROBLEM SOLVING METHODS
S.NO	**PART-A**
1	Define Uninformed Search Strategies Uninformed Search Strategies have no additional information about states beyond that provided in the problem definition. ✓ Strategies that know whether one non goal state is "more promising" than another are called Informed search or heuristic search strategies.
2	Categorize the uninformed search strategies There are five uninformed search strategies as given below. • Breadth-first search • Uniform-cost search • Depth-first search • Depth-limited search • Iterative deepening search • Bidirectional Search
3	Compare blind search& heuristic search Blind search has no information about the no. of steps or the path cost from the current state to the goal, they can distinguish a goal state from nongoal state. Heuristic search knowledge given. Problem specification solution is best.

<table>
<tr><td>4</td><td>Compare BFS and DFS

<table><tr><th>BFS</th><th>DFS</th></tr><tr><td>BFS means breath wise search</td><td>DFS means depth wise search</td></tr><tr><td>Space complexity is more</td><td>Space complexity is less</td></tr><tr><td>Do not give optimal solution</td><td>Gives optimal solution</td></tr><tr><td>Queuing fn is same as that of queue operator</td><td>Queuing fn is some what different from queue operator</td></tr></table></td></tr>
<tr><td>5</td><td>List the time&space complexity associated with depth limited search.
[CO2,L1,Apr/May-14]
Time complexity =O (bd) , b-branching factor, d-depth of tree
Space complexity=o (bl)</td></tr>
<tr><td>6</td><td>Whether uniform cost search is optimal? [CO2-L1-Apr/May-14]
Uniform cost search is optimal & it chooses the best solution depending on the path cost.</td></tr>
<tr><td>7</td><td>Describe CSP[CO2-L1-Apr/May-14]
A constraint satisfaction problem is a special kind of problem satisfies some additional structural properties beyond the basic requirements for problem in general. In a CSP; the states are Described by the values of a set of variables and the goal test specifies a set of constraint that the value must obey.</td></tr>
<tr><td>8</td><td>Define heuristic function
A heuristic function or simply a heuristic is a function that ranks alternatives in various search algorithms at each branching step basing on an available information in order to make a decision which branch is to be followed during a search.</td></tr>
<tr><td>9</td><td>Define backtracking search
The term backtracking search is used for depth-first search that chooses values for one variable at a time and backtracks when a variable has no legal values left to assign.</td></tr>
<tr><td>10</td><td>What is Constraint propagation
Constraint propagation is the general term for propagating the implications of a constraint on one variable onto other variables.</td></tr>
<tr><td>11</td><td>Describe iterative deepening search.
Iterative deepening is a strategy that sidesteps the issue of choosing the best depth limit by trying all possible depth limits: first depth 0, then depth 1,then depth 2& so on.</td></tr>
<tr><td>12</td><td>What is called as bidirectional search?
The idea behind bidirectional search is to simultaneously search both forward from the initial state & backward from the goal & stop when the two searches meet in the middle.</td></tr>
<tr><td>13</td><td>Explain depth limited search.
Depth limited avoids the pitfalls of DFS by imposing a cut off of the maximum depth of a path. This cutoff can be implemented by special depth limited search algorithm or by using the general search algorithm with operators that keep track of the depth.</td></tr>
<tr><td>14</td><td>Carryout the criteria for the evaluation of search strategy.
There are 4 criteria:
Completeness
time complexity
space complexity
optimality.</td></tr>
<tr><td>15</td><td>List the various informed search strategy.
Best first search –greedy search
A* search
Memory bounded search-Iterative deepening A*search</td></tr>
</table>

	• simplified memory bounded • A*search Iterative improvement search –hill climbing • simulated annealing.
	PART-B
1	Explain BFS and DFS in detail.
2	Summarize the back tracking search for CSPs
3	Discuss in detail about the crypt arithmetic problems in CSPs.
4	Explain hill climbing in detail.
5	Discuss in detail about A* and AO*algorithm,
6	Discuss in detail about alpha-beta pruning process.

UNIT III KNOWLEDGE REPRESENTATION	
PART-A	
1	Describe a Sentence. Each individual representation of facts is called a sentence. The sentences are expressed in a language called as knowledge representation language.
2	Define First Order Logic. • First-order logic (FOL) models the world in terms of – Objects, which are things with individual identities – Properties of objects that distinguish them from other objects – Relations that hold among sets of objects – Functions, which are a subset of relations where there is only one "value" for any given "input"
3	What are the types of Quantifiers? Universal Quantifiers & Existential Quantifiers
4	What is Universal Quantification? Universal quantification a. x)P(x) means that P holds for all values of x in the domain associated with that variable∀(b. mammal(x)→x) dolphin(x) ∀E.g.,
5	Proposition symbols can be connected with Boolean connectives, to give more complex meaning. Connectives , o Λ Logical Conjunction o V Logical disjunction o ¬ Negation o ⇔ Material Equivalence or Biconditional o ⇒ Material Implication or conditional
6	• Facts- truths in some relevant world. These are the things we want to represent. • Representation- These are the things we will actually be able to manipulate.
7	Define unification. When attempting to match 2 literals, all substitutions must be made to the entire literal. There may be many substitutions that unify 2 literals, the most general unifier is always desired
8	Define Semantic Networks In semantic net, information is represented as a set of nodes connected to each other by a set of labelled arcs, which represent relationship among the nodes. In this network, inheritance is used to derive the additional relation.

9	Define Forward Chaining. The Generalized Modus Ponens rule can be used by Forward Chaining. □ From the sentences in the KB which in turn derive new conclusions. □□ Forward chaining is preferred when new fact is added to the database and we want to generate its consequences.
10	What is Backward chaining? Backward chaining is designed to find all answers to a question asked to the knowledge base. Therefore it requires a ASK procedure to derive the answer.
11	What is prolog program? A prolog program is described as a series of logical assertions each of which is a Horn Clause. □ A Horn Clause is a Clause that has atmost one positive literal, Example: - P, ¬P□Q
12	What is Resolution? Resolution is a complete inference procedure for first order logic □ Any sentence a entailed by KB can be derived with resolution □ Catch: proof procedure can run for an unspecified amount of time
13	How to represent categories of obtects? • Predicates • Objects
14	Define intrinsic and extrinsic property • The property which describes a particle of an object. • The property which describes a whole particle of an object.
15	How to represent mental events and objects • Theory of beliefs • Modal logic • Syntactic theory
16	Define monotonic reasoning monotonic reasoning attempts to formalie reasoning with incomplete information. (Ex) human reasoning is non-monotonic reasoning Mathematic reasoning is monotonic reasoning
	PART-B
1	Discuss in detail about First order logic with an example.
2	Explain unification algorithm in detail.
3	Explain in detail about forward and backward chaining in detail.
4	Define resolution. Explain resolution with an example.
5	Define events. Explain the necessity for mental events and objects in reasoning.
6	Illustrate the knowledge representation in detail.